

ABSTRACT

Nowadays, daily life relies on communication. Providing real-time support communications can ensure decision making and action, especially in disaster area. In these critical situations such as natural disasters, a central command center would send critical information, over the wireless Public Protection and Disaster Relief (PPDR) network, to rescue teams. In addition to the area of natural disasters, the energy consumption of each device and the lifetime of the device becomes a crucial issue due to the possibility of power supply being turned off in the disaster area. Therefore, communication networks that support real-time and energy-efficient wireless communications are required. We propose and evaluate a device-to-device clustering communication to solve this problem in this final project.

The 5G technology, device-to-device (D2D) became one of the strong candidates for the PPDR system. D2D clustering communications can reduce energy consumption and improve Quality-of-Service (QoS). One of the key components of clustering is the selection of so called cluster head (CH) nodes that are responsible for the formation of clusters and act as a synchronization and radio resource management information source.

In this thesis work we propose a weighted CH selection algorithm IWACA (Improved Weighted Application Aware Clustering Algorithm) for D2D clustering communication to solve problems in disaster areas based on energy consumption, delay and nodelifetime. In this thesis work we also analyze and design WACA (Weighted Application Aware Clustering Algorithm) and WCA (weighted clustering algorithm) and compared the result with IWACA. The calculation results show that the energy efficiency can be achieved with the proposed algorithm IWACA compared with WCA and WACA algorithm, in addition to the delay is also reduced resulting in increased QoS. Simulation results show that weighted clustering approach can be an alternative for PPDR scenario.

Keywords: Device-to-device communication, PPDR, energy efficient, delay, node lifetime, clustering algorithm.